

3/pts

~~DESCRIPTION~~

~~DATA PROCESSING APPARATUS AND DATA PROCESSING METHOD~~

Field of the invention.

~~Technical Field~~

The present invention relates to a data processing ~~apparatus~~ *System and method* and ~~data processing method, and suitably~~ applied to such as an IRD (integrated receiver decoder) for the DVB (digital video broadcast).

Background of The invention

~~Background Art~~
IN A TYPICAL

~~Heretofore, in this type~~ of digital broadcasting system, after the video data and audio data of plural channels are compression-coded ~~by~~ *for example* using the MPEG2 (moving picture experts group phase 2) ~~these data~~ *STANDARD THE DATA IS* are packetized per the predetermined unit (such as ~~184~~ *bit* byte) (hereinafter, the resultant packets are referred to as TS (transport stream) packets) and multiplexed, to form a transport stream which is then transmitted via terrestrial wave, satellite wave or cable as the digital broadcasting signal.

In such digital broadcasting system, a receiving apparatus extracts TS packets corresponding to a desired channel from among the TS packets contained in the transport stream received as a digital broadcasting signal, and decodes them *Back* to the video data and audio data in the original signal format according to the reverse procedure to the compression processing.

09646589-001900

A In recent years, such a receiving apparatus has ~~plural~~ ^{a plurality of}
 A ~~output terminals for digital signals as~~ ^{signal} output terminals for
 A external connection^s (hereinafter referred to as digital output
 terminal). This allows audio data obtained by the aforementioned
 decoding, after being converted into a predetermined format, to be
 A output to an external apparatus via an optical digital audio
 A output terminal of ~~IEC (International Electro-Technical Committee)~~
 A ~~958 format~~, or to be output to an external apparatus via a high-
 A speed serial interface ~~called IEE (Institute of Electrical and~~
 A ~~electronics engineers)~~ ¹³⁹⁴, or allows the transport stream before
 decoding itself to be output to an external apparatus.

Since degradation in image quality and sound quality does
 A not occur in such digital ^{ized} ~~ized~~ video data and audio data, a digital
 recording apparatus can ^{duplicate digital data on} ~~duplicate~~ data unlimited number of times without
 degradation in quality.

Therefore, in general, by transmitting video data and audio
 data after adding predetermined copy control data (CCI: copy
 A control information) at the transmitting end, copy^{ing} is restricted
 based on the copy control data at the digital receiving end, and
 A thus, unlawful ^{copying} ~~dubbing~~ ~~infringing the copyright~~ can be prevented.

According to the SCMS (serial copy management system)
 adopted in the IEC 958^{Standard}, this copy control data has three types of
 information: "never copy", "copy once", and "copy free". More
 specifically, "never copy" ^{Indicates that Copying} ~~represents that copy~~ is not allowed,
 "copy once" ^{Indicates that only one} ~~represents that copy~~ is allowed only once (after copy
 ~

006160" 58594960

The copy control data

~~once, the information shifts to "never copy"), and "free copy"~~

~~Indicates that copy is allowed, an unlimited number of times. In the~~
~~represents that copy is allowed, an unlimited number of times. In the~~
aforementioned digital broadcasting system, such copy control data

~~is added to each program and is transmitted to prevent unlawful~~
~~dubbing infringing the copyright.~~

~~However, considering that~~ *if a*
~~digital broadcasting signal with~~ *its*
~~copy control data, "copy once" is received by the aforementioned~~ *set to*

~~receiving apparatus having plural digital output terminals and~~
~~recorded in a digital recording apparatus, the digital signal is~~ *input by digital recorder*
~~output from the plural digital output terminals at the same time.~~ *each of the plurality of*

~~Therefore, even if copy is allowed only once, plural copies are~~ *only one* *more than one copy may be*
made by connecting each digital output terminal to a digital
recording apparatus.

In addition, in practice, it has been quite difficult for
the receiving apparatus equipped with plural digital output
terminals to use new application that limits the number of copies
such as pay-per-download.

Summary

~~Disclosure of the Invention~~ *Provides*

~~The present invention has been done considering the above~~
~~point and is proposing a data processing apparatus and data~~
~~processing method capable of conducting the copy control without~~ *that prohibits unauthorized copying*

~~fall.~~ *The*
~~To obviate such problem, the present invention, the~~
~~provide plural output terminals for transmitting digital data to~~ *Provides a plurality of*

which the predetermined control data to be supplied is attached, and a control means for controlling the output of each output terminal so as to output digital data via only one specified output terminal out of the plural output terminals according to the contents of copy restriction based on the control data.

A As a result, ~~in this data processing apparatus~~, when the copy restriction exists in the control data, the digital data can be prevented from being output via the plural output terminals.

Furthermore, according to the present invention, in the case of outputting digital data to which the predetermined control data to be supplied is attached via ^{a plurality of output formats} ~~plural output systems~~, each output ~~format system~~ is controlled according to the contents of copy restriction in the control data, so as to output the digital data via only one output ^{format} ~~system~~ out of the ^{plurality of output formats} ~~plural output systems~~.

As a result, according to this data processing method, when the copy restriction exists in the control data, digital data can be prevented from being output via the plural output systems.

Brief Description of the Drawings

Fig. 1 is a schematic diagram showing the construction of a digital broadcasting system according to the embodiment of the present invention.

Fig. 2 is a block diagram showing the construction of a receiving apparatus according to the embodiment of the present invention.

~~Best Mode for Carrying Out the Invention~~

With reference to the accompanying figures one embodiment of
the present invention will be described. ~~Note that, the following~~

description is made using an EMD (electric music distribution) ~~system~~

~~adopting~~ the digital broadcasting ~~system~~ and this invention is
applicable not only to the EMD but also to movie distribution
service.

In Fig. 1, numeral 1 generally shows a digital broadcasting
system 1 according to the present invention. At the transmitting
apparatus 2, music data for ~~plural channels to be provided~~ are
compression-encoded using the MPEG2 system and ~~then, the~~
~~resultants~~ are TS-packetized per the predetermined unit and
multiplexed, so as to form a transport stream. In addition, in
this digital broadcasting system, not only the music distribution
service but also video and audio data of programs such as a film
and a drama can be compression-coded using the MPEG system and
transport streams are formed. Thus formed plural transport streams
are frequency-multiplexed and transmitted.

At this point, ~~this~~ transmitting apparatus 2 inserts a TS
packet ~~storing~~ copy control data in a predetermined format into
the transport stream for the music distribution service. ~~The~~ copy

control data are classified under the first level ~~that~~ prohibits
copy, the second level ~~that~~ allows copy ~~once~~, and the third level
~~that~~ allows copy ~~freely~~.

Programs

using

A ~~That is, programs~~ which are transmitted ~~in~~ ^{using} digital satellite broadcasting include copyright information ~~so as~~ to prevent ^{copyright infringement} ~~unlawful copy infringing copyright~~. ^{IN} ~~And in~~ a PMT (program map table) of a transport stream, the copyright information which relates to the service is inserted by being added to the contents, *A* as two descriptor^s, DM_copy_control_descriptor^s and digital_copy_control_descriptor.

The descriptor called DM_copy_control_descriptor includes information on analog video output, such as trigger information for analog copy guard. In addition, pay-per-tape (service to charge every time when recording on a recording medium such as a magnetic tape) information is also included. When a user records contents which is the pay-per-tape, he should ask and pay additional fee to release the analog copy guard. If he does not ask, the analog copy guard is not released.

The descriptor called digital_copy_control_descrpotor includes CGMS (copy generation management system) information which is the same as the aforementioned SCMS and the digital output is controlled according to this information.

A ^{the} ~~This~~ ^{indicate} CGMS ~~is~~ copyright information^{is} represented by two bits. *A* ~~These~~ two bits ~~means~~ ^{indicate} as follows:

- A* "00" shows that copy^{is} allowed freely.
- A* "01" shows that copy^{is} not allowed in CGMS.
- A* "10" shows that copy^{is} allowed only once.
- A* "11" shows that copy^{is} never allowed.

006T60"68594960

09646589-0919009

The Present
A In ~~this~~ invention, outputs from the plural digital output terminals are controlled according to the contents of ^{the} ~~the~~ descriptor called the digital_copy_control_descriptor.

A In ~~this way, the~~ ^{The} transmitting apparatus 2 transmits a digital broadcasting signal S1 ^{comprising a} ~~consists of this~~ frequency-

A multiplexed transport stream via a communication satellite (CS) 3. ^{Then transmitted} ~~and the transmitted~~ digital broadcasting signal is ^{supplied} ~~supplied~~ to a receiving apparatus 5 via an antenna 4.

The receiving apparatus 5 selects a desired frequency from the received digital broadcasting signal, extracts the TS packets having the audio data of a desired tune from the transport streams transmitted at the selected channel, and decodes the audio data stored in these TS packets for transmission to a speaker 6 and also for output to digital recording apparatuses 7, 8 such as a MD (mini disc) recorder via a digital output terminal (not shown) as required.

A In practice, the receiving apparatus 5 is constructed as shown in Fig. 2. A front-end unit 10, receiving the digital broadcasting signal S1 via the antenna 4, tunes ^{the} a frequency (frequency assigned to a transponder loaded on the communication satellite 3) based on a channel specification command S2 transmitted from a control unit 11. Then, it performs, for example, QPSK (quadrature phase shift keying) demodulation and error correction processing and outputs a transport stream D1 having the coded data of the desired program.

006150-62594960

A ~~Then~~ descrambler 12 sequentially descrambles the encrypted TS packets using a decryption signal S3 which is obtained from the control unit 11, and transmits the descrambled transport stream D2 to a demultiplexer 13.

The demultiplexer 13, receiving a control signal S4 corresponding to a program specified by the user from the control unit 11, extracts TS packets D3 having the audio data of the specified program and a TS packet D4 having the copy control data, and transmits the TS packets D3 to an audio decoder 14 and ~~also~~ ^{transmits} the TS packet D4 to the control unit 11. Note that, in the case where the selected program is a film, drama, or news, TS packets having video data are also extracted and supplied to a video decoder not shown.

A ~~The audio decoder 14~~, after decoding the audio data included in the extracted TS packets, ^{the audio decoder 14, the audio data} transmits ~~this~~ to a D/A (digital/analog) converter 15, an input terminal 16A of a switch 16 and an input terminal 17A of a switch 17, according to a control signal S5 which is ^{sent} ~~obtained~~ from the control unit 15.

The D/A converter 15, after converting the resultant audio data D5 to analog data, transmits this to the externally connected speaker 6 (Fig. 1) via an analog output terminal 18 as an analog audio signal S6. As a result, the speaker ^{reproduces} ~~gives~~ sound based on this analog audio signal S6.

A ~~On the other hand, the~~ ^{the} control unit 11 extracts copy control data D_{cc1} included in the supplied TS packet D4, ^{and determines} ~~judges~~ if the copy

X control data D_{cc1} belongs to the first level that prohibits copy^{ing}

A ~~or~~ the second level that allows ^{only one copy to be made} copy ~~only once~~, or the third level

A that allows ^{an unlimited number of copies to be made} ~~copy freely~~, and transmits switch signals S7 and S8 to

B the switches 16 and 17 respectively according to the ^{determination} ~~judgment~~

~~results.~~

A ~~In this time, only when~~ ^{when} the control unit 11 ^{determines} ~~judges~~ that the decoded copy control data D_{cc1} is the third level, the control unit

A 11 connects switches 16 and 17 to ON conditions. ~~On the other hand,~~

A ^{insert #2} ~~when it judges~~ the copy control data D_{cc1} is the first or the second level, it connects either the switch 16 or 17 specified by the user to ON condition.

At the time when the switch 16 is ON condition and the switch 17 is OFF condition, the audio data D5 supplied from the audio decoder 14 is supplied to a first format processing unit 19. This first format processing unit 19, after converting the audio data D5 to the predetermined format according to the IEC958 for example, transmits this to a first information adding unit 21 as first audio data D6.

A ⁸ ~~The~~ first information adding unit 21, after adding the copy control data D_{cc1} to the first audio data D6, transmits this to the externally connected digital recording equipment 7 (Fig. 1) via a digital output terminal 22.

A ^{for} ~~On the other hand,~~ ^{when} in the case ^{in the} ~~when the~~ switch 16 is ^{in the} ~~OFF~~ condition while the switch 17 is ^{in the} ~~ON~~ condition, the audio data D5 supplied from the audio decoder 14 is given to the second format

processing unit 20. This second format processing unit 20, after converting the audio data D5 to the predetermined format according to such as the IEEE1394, transmits this to a second information adding unit 23 as the second audio data D7.

^e
This second information adding unit 23 ^{adds} ~~as well as adding~~ the copy control data D_{cc1} to the second audio data D7 ^{and} applies ~~the~~ encryption processing to the second audio data D7 only when the copy control data D_{cc1} shows the first or the second level. ^{The data} ~~then, it transmits this to the externally connected~~ digital recording apparatus 8 (Fig. 1) via the digital output terminal 24. This encryption processing is based on the standard called 5CDTCP and is to protect copyright at the time of transmitting digital content data such as audio and video in the IEEE1394.

In this way, the first or the second audio data D6 or D7 to which the copy control data D_{cc1} is attached is ~~is~~ supplied to either digital recording apparatus 7 or 8 which is specified by the user. Thus, in the digital recording apparatus 7 or 8, the first or the second audio data D6 or D7 can be recorded on the predetermined recording medium (not shown ~~in Fig.~~) under the condition in which copy restriction is imposed in the form of the level of the copy control data D_{cc1} .

^{present invention}
According to the ~~construction~~ described above, ~~in this~~ ~~receiving apparatus 5,~~ when the audio data D5 of a program specified by the user is not allowed to be copied or is allowed to be copied only once according to the copy control data D_{cc1} , the

first or the second audio data D6 or D7 is transmitted to either the digital output terminal 22 or 24 which is specified by the user out of two digital output terminals 22 and 24.

Accordingly, the receiving apparatus 5 can supply the first or the second audio data D6 or D7 to which the copy control data D_{cc1} is added, to either digital recording apparatus 7 or 8 which is specified by the user. As a result, in the digital recording apparatus 7 or 8, copy restriction based on the copy control data D_{cc1} can be imposed.

According to the foregoing construction, in this receiving apparatus 5, only when the copy restriction based on the copy control data D_{cc1} exists, the audio data D5 (D6, D7) is output together with the copy control data D_{cc1} to either digital output terminal 22 or 24 which is specified by the user. Therefore, copy restriction can be imposed at the digital recording apparatus 7 or 8 connected to the digital output terminal 22 or 24. And thereby the execution of unlimited dubbing can be avoided in advance.

AF ~~Note that~~ ^T the embodiment described above has dealt with the case of converting the audio data D5 (D6, D7) to which the predetermined copy control data D_{cc1} to be supplied is added, into plural formats (formats corresponding to interface of the IEC958 and IEEE1394) and outputting them. However, the present invention is not only limited to this but also these may be converted into the format corresponding to the interface which is used in various other digital data.

Further, the embodiment described above has dealt with the case of applying the audio data D5 as the digital data to be supplied. However, the present invention ~~is not only limited to this but also it~~ can be ~~widely~~ applied to ^{OTHER TYPES} ~~various~~ digital data such as digitalized video data.

Furthermore, the embodiment described above has dealt with the case of applying the digital output terminal 22 based on the IEC958 and the digital output terminal 24 based on the IEEE1394 as the plural output terminals for outputting the supplied audio data D5. However, the present invention ~~is not only limited to this but also plural~~ digital output terminals based on the IEC958 ^{STANDARD} ~~can be provided in the receiving apparatus and also plural digital~~ ^{and} ~~output terminals~~ based on the IEEE1394 ^{STANDARD} ~~can be provided.~~

Furthermore, the embodiment described above has dealt with the case of applying the control unit 11 as the control means for controlling ^{the} output of each output terminal according to the contents of copy restriction based on the copy control data D_{cc1}. However, the present invention is not only limited to this but also, in short, provided that the audio data D5 (D6, D7) can be output via only one digital output terminal 22 or 24 which is specified out of the plural digital output terminals 22 and 24 when it is ^{determined} ~~judged~~ that the copy restriction is imposed, control means having various other constructions can be used as the control means.

In this case, as a method to specify a digital output

terminal alternatively, the first format processing unit or the second format processing unit can be stopped, in addition to the case where the switches 16 and 17 are switched so that one of them is switched ON.

Furthermore, in the aforementioned embodiment, the copy restriction based on the copy control data D_{cc1} is classified into three: the first level that prohibits copy; the second level that allows copy once; and the three level that allows copy freely. However, the present invention is not limited thereto and a level that allows copy plural number of times (twice or more) can be provided between the second level and the third level.

Furthermore, the embodiment described above has dealt with the case of applying the data processing apparatus according to the present invention to the digital CS broadcasting using the communication satellite 3. However, the present invention is not only limited to this but also it can be widely applied to various broadcasting systems such as the digital terrestrial wave broadcasting and CATV (cable television) broadcasting.

Furthermore, the embodiment described above has dealt with the case of applying the MD recorders as the digital recording apparatus 7, 8 connected to the digital output terminals 22, 24 provided in the receiving apparatus 5. However, the present invention is not only limited to this but also it can be widely applied to the recording apparatus capable of recording various digital data such as a rewritable optical disc apparatus and

digital VTR.

According to the present invention as described above, since the control means for controlling the output of each output terminal in order to output digital data only via one specified output terminal out of plural output terminals according to the contents of the copy restriction based on the control data is provided, the digital data can be prevented from being output via plural output terminals when the control data shows the copy restriction. And thus, a data processing apparatus capable of conducting the data control certainly can be realized.

Furthermore, according to the present invention, in the data processing method, by controlling each output system in order to output the digital data via only one specified output system out of plural output systems according to the contents of the copy restriction based on the control data, the digital data is prevented from being output via plural output systems when the control data shows any copy restriction. And thereby, the data processing method capable of conducting the data control certainly can be realized.

Industrial Applicability

The present invention is utilized for a data processing apparatus and data processing method which are to externally output digital data with predetermined control data to be supplied via plural output systems.

00645589-091900